Towards area-oriented approaches in infrastructure planning

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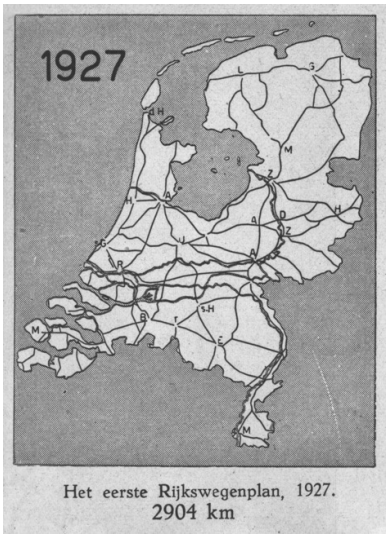
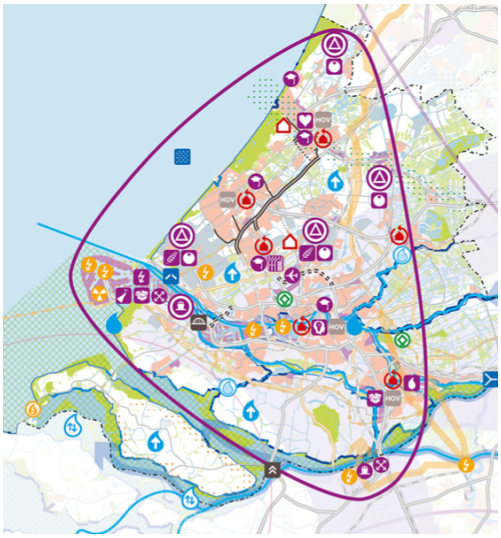
2 Integration in Dutch planning of motorways: From "line" towards "area-oriented" approaches



Het eerste Rijkswegenplan, 1927.
2904 km



The maps above show the difference between the first national highway plan for the Netherlands (left) and the most recent vision of the Dutch government on (a part of) its national highways (right). The first national highway plan consists of many roads that can still be recognized today, but there are also a number of roads that were never built or are no longer considered part of the national highway network. A notable detail of the first plan is that it consists of long straight lines on a predominantly empty map. The planned roads seem to be reaching into the very city centres. Moreover, there is no sign of any environmental considerations, such as routing choices, in the plan for the network. The most recent vision still connects the major cities. However, it no longer does so at the expense of other land use qualities. The map shows a high level of detail. Hence the plan has been divided in a number of regional plan descriptions and maps. The plan combines land uses that are nested at national, regional and local spatial scales. In addition to highways, it integrates many other land uses. This is characteristic for the ambition to make integrated choices about roads and surrounding land uses.

Abstract:
In Dutch motorway planning we can observe a gradual transformation from traditional line-oriented planning towards what are known as area-oriented approaches. Area-oriented planning – apparent in various gradations from landscaping, context-sensitive design, area-oriented approaches to integrated area-development – is expected to better incorporate the complex array of needs, demands and opportunities of the area surrounding newly planned road infrastructure. The integration of infrastructure and other spatial policy sectors such as housing, business, water, nature and recreation is expected to lead to better, more sustainable road infrastructure development. This chapter explores the shift from line-oriented planning towards area-oriented planning. We conducted a historical analysis of policy developments in Dutch road infrastructure planning and have conceptualized area-oriented approaches in road infrastructure planning. Furthermore, the developments observed in the Netherlands are placed in an international perspective, through an overview of developments and practices in several Western countries.

Please note that this chapter uses the term 'motorway', while the rest of this study uses the term 'highway'. This study makes no difference between motorways and highways. Both terms refer to a wide road that is built for fast, long distance travel. Such roads have multiple lanes to accommodate large traffic volumes. These lanes are separated for each direction and have no level junctions with other roads.

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2.1 Introduction

Traditionally, the planning and realisation of road infrastructure and spatial planning have been separate worlds ('silos') in the Netherlands. Over the last sixty years, a specific autonomous (or sectoral) planning practice for road infrastructure has emerged, narrowly focused on the road and consequently strongly 'line-oriented' in nature. It included specific legislation, a sectoral policy framework, its own funding mechanisms and a specific planning agency. Consequently, road planners have often neglected the interaction between road infrastructure and other spatial functions: the scope of road infrastructure planning has traditionally been rather limited (Arts & De Vaan, 2010; Geerlings & Stead, 2003). The combination of standard solutions resulting from traditional approaches and broad societal and political dynamics has led to increasing complexity in the planning of road infrastructure in the Netherlands (Van der Heijden, 1996; Van den Brink, 2009; Koppenjan & Klijn, 2004). Various authors have indicated that road infrastructure planning requires careful consideration of the area surrounding the projects, as well as the establishment of integrated planning processes and corresponding procedural arrangements (see e.g., Arts, 2007; De Zeeuw & Licher, 2008). As an innovative alternative to the line-oriented planning regime, contemporary planning practice is increasingly seeking more integrated – or 'area-oriented' – solutions: innovative combinations between road infrastructure and developments in other spatial policy sectors such as housing, business, recreation, water, nature and agriculture (Priemus, 2007). Others indicate that shared visions and collaborative efforts from adaptive networks of actors with diverging interests are required to solve the described 'wicked' problems in planning and to achieve more sustainable spatial outcomes (Nooteboom, 2006).

Our first aim in this chapter is to explore and conceptualize the transition from line-oriented approaches towards area-oriented approaches in Dutch motorway planning. Second, we will analyse whether comparable developments can be observed in other countries. Section 2.2 describes the rationale for integration in road and, more specifically, motorway planning. Subsequently, section 2.3 provides an overview of the developments in Dutch road infrastructure planning over the post-World War II period, followed by a further conceptualization of the observed 'paradigm shift' in Dutch motorway planning in section 2.4. Section 2.5 places the emergence of area-oriented approaches in an international context, distinguishing between developments towards spatial and infrastructure integration at strategic planning level and at operational level. The analysis is based on a brief overview of international literature on road infrastructure and spatial planning, and aims to show that comparable trends can be found abroad; however, we do not have the pretention or goal of being exhaustive here. Because of our focus on English-written documents, Anglo-Saxon countries are over-represented in our international overview. Our conclusions, finally, follow in section 2.6.

2.2 Rationale for integrated road infrastructure planning

Several new or renewed planning approaches aiming at the integration of the planning of motorway infrastructure and other spatial planning sectors can be observed in the Netherlands. From a theoretical point of view, such planning approaches imply that the development and redevelopment of road infrastructure projects is accompanied by the development of the area as a whole, including an assessment of all interests involved in the decision-making process (Bregman, 2009). The emergence of these approaches seems to be a response to the incapability of traditional road planning in dealing with contemporary dynamics and increased complexity within the planning arena (see also figure 2.1). We address these dynamics, which arise from multiple, interrelated trends in society, politics and the financial-economic system, as follows (see also Arts, 2007):

- Increased environmental awareness—since the 1970s (influenced by Club of Rome, 1972 and WCED, 1987) the sustainability debate has increasingly influenced society and politics in thinking on environmental and climate change issues.
- Changing distribution of roles between government and others—following neo-liberal governance thinking, government is increasingly involving market and other societal partners in policy development in order to promote efficient task distribution and to ensure optimization of policy outcomes. In addition, the distribution of tasks and responsibilities between the layers of government is changing.
- Emergence of the network society—influenced by developments in IT and globalization, society is restructuring into flexible and adaptive networks of actors (Castells, 2000). This influences people's perceptions on the position and use of space and, consequently, changes needs and desires regarding spatial development (Hajer & Zonneveld, 2000).
- Changing financial-economic arrangements—due to the worldwide economic crises endured since 2007, governments and private actors are reconsidering their finances and looking for new balances between income and expenditure.
- Increasing influence of European and domestic regulation—regulation on environmental issues requires a more strategic approach to involve environmental considerations in planning.
- Increasing scarcity of space—especially in small and crowded locations, such as in parts of the Netherlands. This demands innovative combinations of functions to ensure balanced spatial development and to avoid conflicting interests.

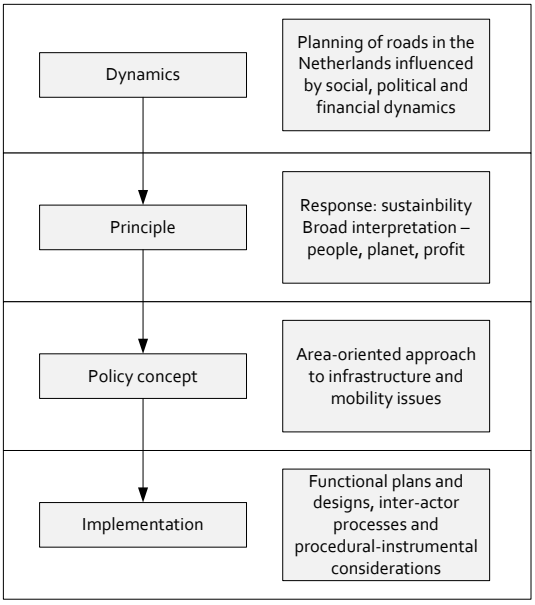

Figure 2.1. The concept of area-oriented planning as a translation of sustainability principles, in response to social, political and financial dynamics

Authors such as Healey (2007) and Gunder (2006) indicate that in order to incorporate these dynamics into the planning process for road infrastructure, a more sustainable approach is required. Regarding the definition of sustainability we stick here to the UN report 'Our Common Future' (WCED, 1987), one of the first contributions to define sustainability adequately: "[Sustainable development is] development that meets the needs of the present without compromising the ability of future generations to meet their own needs". As an expression of the need for planning to overcome its traditional economic orientation in decision-making and in order to promote a broad, holistic perspective on sustainability, the concept ideally combines economic, social and ecological aspects of growth and development (Gibson, 2005; De Roo & Porter, 2007).

Taking the above into account, the integration of infrastructure and other spatial policy sectors such as housing, business, nature, environment, water and recreation is expected to lead to more sustainable road infrastructure development. Area-oriented planning aims to broaden the functional and time scope within which infrastructural issues are being approached, and as such can be regarded as a flexible or adaptive planning approach. Flexibility in this respect mainly refers to the short term, where the convergence of infrastructure planning and planning for other land use functions opens up a wider range of potential solutions, which may lead to synergetic project outcomes which are more resilient for uncertain future developments.

Since effectiveness of traditional engineering-oriented strategies is increasingly uncertain due to the described societal, political and financial-economic dynamics, we seem to be in need of "soft" planning approaches in addition to traditional engineering perspective (Hansman et al., 2006; see also Kwakkel & Van der Pas, 2011). Where the focus has

traditionally been on finding infrastructural solutions to mobility issues, it now converges on finding solutions within the broader spatial system. By taking into account the characteristics and demands of specific areas, it intends to combine the top-down policy objective of sustainable development with a bottom-up interpretation through area-specific developments. To ensure this, area-oriented planning intends to combine a sustainable policy agenda with sustainable planning processes that, from the early stages on, exploit collaborative actor capacity. Healey (2007; see also Nooteboom, 2006) notes that against the background of the increasing involvement of civil society in the planning debate, "a wave of enthusiasm for collaborative and deliberative forms of policy-making is sweeping across academic and policy arenas. These seem to offer opportunities for innovation and creativity in developing policy concepts and knowledge resources to support new ideas", which seem to be required to overcome the gap between policy and implementation of sustainable infrastructure planning.

Another dimension to the sustainability rationale for these planning approaches, related to the opportunities for synergetic development it has to offer, is of financial-economic nature. Against the background of the financial-economic crisis – which has demonstrated that the public provision of infrastructure may be financially unsustainable – integration of infrastructure and spatial planning offers promising alternatives for public administrations to pursue the desired planning of motorway networks. Financial-economic societal benefits in general may be expected as synergies from integrated investments may provide opportunities for public administration to capture value increases and as such to recover some of the public investment. Moreover, public investment in road infrastructure may act as a trigger for profit seeking private actors to participate in related spatial developments, which may benefit from new or improved road infrastructure. To tune public and private involvement, suitable mechanisms of legal and planning instruments are necessary. Examples of such mechanisms are the Planning Gain system in the UK, where private investors are obliged to complement beneficial developments in for instance real estate with the realisation of essentially public tasks such as infrastructure development, and, the comparable cost recovery system in the Dutch Land Development Act (Janssen-Jansen & Woltjer, 2010; Muñoz Gielen, 2010). Central concepts are cost recovery and value capturing (Van der Krabben & Needham, 2008). A relevant example of value capturing in Dutch planning practice is the Sijtwende-project, where a long-lasting impasse in road development was overcome by taking an area-oriented perspective: the infrastructural issue was transformed into a joint programme for infrastructure and development of real estate within an attractive environment managed by a public-private partnership (Edelenbos & Teisman, 2008).

We conclude that the practical implementation of area-oriented concepts has two main dimensions: (1) the functional-spatial plans and designs and (2) the related institutional organization that provides structure to inter-actor collaboration and that has to assure that time and money constraints are realistic (Geerlings & Stead, 2003; Hansman et al., 2006; Arts & Van Tatenhove, 2004).

2.3 Historical analysis of policy integration in motorway planning in the Netherlands

Policy integration appears to provide opportunities to overcome the complexity experienced in Dutch infrastructure planning, emerging from the societal and political dynamics described. The overview of relevant developments in Dutch road infrastructure planning in this section is structured by two different types of integration of the infrastructure planning system: internal and external integration (De Roo, 2003). Internal integration is a process of convergence of policy-making and planning for several components within the traffic and transport policy sector; external integration can be understood as a process of integration between road infrastructure and further spatial policy sectors. However, to obtain the necessary background information, we will first describe the emergence of the Dutch road infrastructure planning sector.

2.3.1 Early developments

The second half of the 20th century was a period of large-scale mobility growth in Western countries. Influenced by economic prosperity and societal developments, travel patterns changed substantially and car ownership increased vastly (Banister, 2002; Mom & Filarski, 2008). To accommodate this changed mobility behaviour, massive investments were systematically made from the 1960s onward to provide for an adequate road infrastructure network. "Predict and provide" (Bertolini, 2009), with predictions being based on forecasting and comprehensive land use-transport models was the prevalent approach (e.g., CATS and UTPS in the US) (Lee, 1973; Kwakkel & Van der Pas, 2011). In the Netherlands, starting with the national road infrastructure plan of 1968, these policy developments have resulted in the emergence of a separate, mature and powerful road infrastructure planning sector in the Netherlands – including specific policy, financial and institutional arrangements – characterised by a strongly line-oriented approach (Struiksma & Tillema, 2009). Evidence for the initial success of the road infrastructure planning sector and the top-down infrastructure policy can be found in the growth of the national motorway network: from 333 km in 1960 to 1540 km in 1975 (V&W & VRO, 1977).

In the period after 1975, Dutch personal mobility kept growing: between 1970 and 2000 the number of kilometres travelled doubled in the Netherlands. For the period to 2040, a continuation of car mobility growth is expected, although at a lower rate due to demographic developments (MNP et al., 2006). To accommodate continuous growth, the realisation and modification of the road infrastructure remains a necessity. However, increasing public awareness of environmental and growth issues since the early 1970s directed public attention to the negative effects of increasing car traffic, which used to be only positively valued. Due to the attention paid to the effects of both traffic (e.g., pollution and safety) and physical infrastructure (e.g., loss of habitats, damage to landscapes and the role infrastructure plays as a physical barrier), public opposition to infrastructure projects increased dramatically. Along with the economic and financial impacts of the oil crisis in the 1970s, this started to cause considerable delays in planning and decision-making on road infrastructure projects. To cope with these new circumstances and sustain the necessary growth of the road infrastructure network, the

initial internal engineering orientation of the infrastructure planning system, needed to be adapted into a more socio-technical approach (Van der Heijden, 1996; Hansman et al., 2006). This included the abandonment of large-scale modelling as single point of departure for the planning of the motorway system (Lee, 1973). Table 2.1 provides a selection of influential policy documents, which also structure the rest of our historical overview.

Table 2.1. Selection of influential policy documents regarding developments in the Netherlands

Year	Name		Relevance
1960s	Rijkswegenfonds; Rijkswegenplan	National road infrastructure fund; National road infrastructure plan	Initial sectoral approach to infrastructure planning and accompanying financial arrangements
1975	Meerjarenplan Personenvervoer	Long-range Personal transport programme	Coordination between modalities as a way to decrease infrastructural use of space
1977	Structuurschema Verkeer en Vervoer	National structure plan for traffic and transport	Broadening of the scope to comply with demand for mobility: recognition of negative effects of road infrastructure, routing policy
1988	2e Structuurschema Verkeer en Vervoer	Second structure plan for traffic and transport	Internal integration in order to decrease car dependence and improve public transport
1990	MIT	MIT: Long-range infrastructure and transport programme	Overview of planning and realisation of national transport infrastructure
1998	Ambities Bundelen	Advice on coordination of infrastructure and surroundings	From regulation and protection towards a development-oriented approach
2004	MIT-SNIP	Introduction of the water component in long-range Infrastructure and transport programme	Integration of infrastructure and water, regionally-oriented approach to mobility and transport issues
2006	Nota Ruimte	National spatial plan	Comprehensive and integrated spatial policy
2006	Nota Mobiliteit	National mobility plan	Integration of infrastructure planning with other spatial policy sectors
2008	Elverding report	Committee on acceleration in decision-making around infrastructure projects	Future directions for road infrastructure planning. Keywords: faster and better
2008	MIRT	MIRT: long-range infrastructure, space and transport programme	Policy and investments in spatial domain based on comprehensive and coherent views. Aims: overcome complexity and achieve

2.3.2 Internal integration

Taking into account the declining public support for line-oriented road infrastructure planning, it became clear that accommodating the increasing personal mobility needs in the Netherlands could not only be achieved by the provision of additional road infrastructure. An internal broadening of the scope of Dutch mobility policy was first introduced in the Netherlands in the 1970s when it appeared that the demand for mobility was hard to influence, with a policy switch from demand-following policy to demand-guiding policy, aiming at influencing mobility behaviour (V&W, 1975). Policy included targets for achieving multi-modal solutions for improved coordination between transport networks and modalities. An important example of an attempt to steer the demand for mobility in a desired direction is the establishment of location-specific accessibility profiles ('ABC policies').

Another major example in sector internal integration was the establishment of a comprehensive long-range infrastructure and transport programme for road, rail and (from 2004) water transport – the MIT: Long-range Infrastructure and Transport programme – in 1990 (see table 2.1). This programme intended to develop internally integrated traffic and transport policy to improve accessibility, guide mobility and improve liveability. In addition, from the late 1990s, infrastructure policy has been established in increasingly close cooperation with regional and local administrations in order to coordinate transportation and mobility requirements at different institutional levels. Related to this are the recent policy aims of the Dutch Ministry of Transport and its executive agency (Rijkswaterstaat, the Department of Public Works & Water Management) to consider the coherence of the main road network and the network of underlying roads, railways and waterways and to position the user of the road infrastructure network centrally to its operations (RWS, 2004; V&W, 2004). The main aim of policy and operations is now to improve the traffic flows on the road infrastructure network, as experienced by its users. This strategy requires close cooperation between managers of different transport networks (Van den Brink, 2009).

2.3.3 External integration

Almost simultaneously with the emergence of internal integration, external integration processes were carefully and slowly initiated as a parallel path for overcoming the difficulties experienced in Dutch road infrastructure planning. Cross-sectoral coordination has become a widespread tradition in Dutch planning since the 1990s. Spatial policy sectors have increasingly converged with integrated approaches being established in environmental planning, water planning, nature planning, rural planning and urban planning. However, until recently transport and traffic planning has remained a solitary policy sector, largely separated from spatial planning sectors. This is primarily due to the absence of a financial need for integration, with the sector having its own sources of funding (De Roo et al., 2001).

Struiksma and Tillema (2009) have established a conceptual model that consists of three different types of external integration in road infrastructure planning, illustrating the emergence of area-oriented planning approaches in infrastructure planning (see figure 2.2).

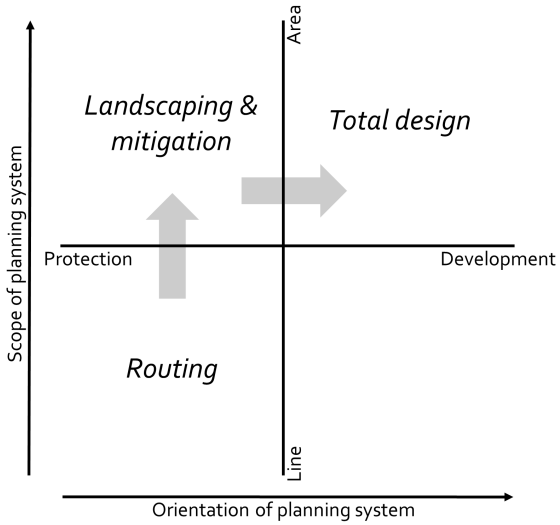

Figure 2.2. Trends towards area-oriented infrastructure planning (Struiksma et al., 2008)

Routing

The increased societal and political attention paid to environmental issues has led to the need to minimise the adverse environmental effects of road infrastructure. In the first instance this was to be achieved from an engineering perspective through careful routing of road infrastructure. Routing policy was first introduced in the structure plan for traffic and transport in V&W and VRO (1977), recognizing the relevance of the relationship between infrastructure and other spatial developments. This structure plan also emphasized the need for specific planning instruments for road infrastructure capable of recognising the relationships with other policy sectors from an early stage in the planning process (V&W & VRO, 1977). However, for the most part, infrastructure policy still remained separated from other spatial policies (Struiksma & Tillema, 2009).

Landscaping and mitigation

Despite careful routing, roads will always cut through an area. Therefore, policymakers experience a continuous tension between the development of road infrastructure and liveability, and spatial and environmental quality. Minimizing the adverse effects requires road infrastructure planning to be handled more carefully than by simple routing (RVW, 1998). To protect nature and the environment from the adverse effects of road infrastructure, over time, a trend towards a broader spatial scope can be observed in planning. In rural areas, measures are oriented at, for instance, protection against the damage to ecosystems and the landscape. In urban areas, policy is oriented at the barrier function – socially and physically – and nuisance caused by the use of roads (Struiksma & Tillema, 2009).

Mitigation and compensation measures are exemplary of landscaping and mitigation and are based on the principle that at those locations where the spatial claims are large or the environment is more vulnerable, planning requirements are stricter (V&W, 1990). In addition, from 2004 the intention has been to prevent and, where necessary, repair

fragmentation of nature and landscapes with attention to place-specific solutions such as wildlife over and under-passages and noise barriers (VROM et al., 2004). However, it appears that the costs of mitigation and compensation are often high and the measures inadequate to prevent landscape cluttering (RPB, 2006). Therefore, the programme 'Route design' aims to combine road construction or adaptation with its surroundings to limit ad hoc spatial development along motorways. A distinction is made between different landscape types, such as urban and rural or nature and river areas and users of the road must experience the distinctive character of the environment of the road (Van Zelm van Eldik, 2008).

Total design

Despite the developments described, which have all sought new approaches for dealing with the complexity of road infrastructure planning in the Netherlands, a certain disconnection remains in the relationship between road infrastructure and its surroundings. In many cases, both planning and realisation of road infrastructure have remained sectoral and line-oriented affairs. However, this has also been true the other way around: spatial planning has also paid little attention to the mobility consequences of new planning proposals regarding, for example, housing and business estates (see Struiksma et al., 2008). Priemus et al. (2001) have claimed that it is striking "how little importance public authorities attach to the interaction between spatial dynamics and mobility". Nevertheless, the current planning paradigm is that a restrictive planning regime – under which government protection against development is the point of departure for spatial development (Salet & Woltjer, 2009) – and the barriers between sectors in spatial planning lead to cost and time overruns. A more efficient alternative would be a development-oriented planning system, aiming at synergetic development and redevelopment of areas by means of 'total design'. The Dutch Ministry of Housing, Spatial Planning and the Environment stresses the importance of "integrative activities" and "cooperative processes of complementary actors" who share the initiative for spatial intervention (RPB, 2004). The idea is that road infrastructure should be adapted to its surroundings and vice versa (RVW, 1998; Rijksadviseur voor de infrastructuur & BAPS, 2008) and, therefore, thinking should be both from elements of infrastructure to the area (inside out), and from the area towards infrastructure elements (outside in) (Arts, 2007). In order to achieve this, the various government agencies with spatial interests aim to come up with shared, integrated visions on affluence, economy, space and mobility, to serve as a national planning framework (RVW, 1998; V&W, 2009) (figure 2.3).

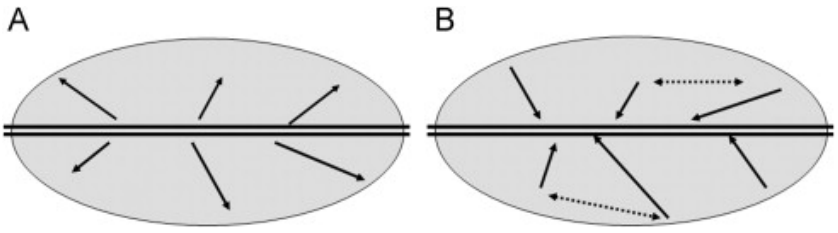

Figure 2.3. Area-oriented approaches in road infrastructure combine two perspectives: (A) inside-out and (B) outside-in

In these integrated approaches, different scale levels for planning intervention can be distinguished, relating to different objectives. At a micro level, total design approaches are influenced by a strong sense of urbanism including architectonic and aesthetic values as well as multifunctional designs (Shannon & Smets, 2010). On a neighbourhood level, a Dutch example is the earlier mentioned Sijtwende-project, whereas, on a city level, the A2 motorway Maastricht-project is a good example. In the latter example an integrated solution combining a land tunnel, real estate developments and improvements in the public space was meant to get rid of a road bottleneck while at the same time increasing liveability. Both cases, however, still strongly focus on contemporary contextual configurations, which may limit the capacity to deal with future uncertainties. At a macro level, the focus is on more abstract regional and strategic planning, aiming at comprehensive plans or ambition agendas for a region as a whole (Zanon, 2011). In the Netherlands this can be found for example in the Eindhoven region, in the south-western part of the country, where infrastructure network improvements are reconsidered in conjunction with measures for maintaining the regions' attractiveness.

The above points of view are reflected in the Dutch spatial and mobility policy and in the project programming and budgeting system (V&W, 2004 and VROM et al., 2004). To overcome the risk of planning becoming cost and time inefficient once more – caused by broad stakeholder involvement and unfounded comprehensiveness – the turn towards total design needs to be accompanied by a reconsideration of planning processes. In line with this an influential committee on the future direction of Dutch road infrastructure planning policy, i.e., the Elverding committee, reported on options for the revision of the Dutch road infrastructure planning system (Elverding, 2008). According to this committee, an efficient planning process requires a clear divide between strictly time bound planning phases. In the early explorative stages, which broadly explore a wide range of options and involve (local) stakeholders in a transparent process, the purpose is to come to one preferential alternative, which is not reconsidered in later stages. The following project study phase should include a compact, transparent and thorough study of the chosen alternative (Lenferink et al., 2008). Furthermore, the desire for increased integration and coherence among spatial policy sectors has initiated the merge of national funds for infrastructure and spatial developments in the Long-range Programme for Infrastructure, Space and Transport Programme and its accompanying framework of rules for the planning, programming and budgeting process (MIRT as replacement for the abovementioned MIT: R stands for 'ruimte': space) (V&W, 2009; V&W & VROM, 2009).

2.4 Conceptualization of integration in infrastructure planning in the Netherlands

2.4.1 Line planning towards area-oriented planning: conceptualizing the developments

Figure 2.4 visualises the conceptual development from line-oriented planning towards increasingly integrated approaches, related to the dimensions of planning that were discussed in section 2.3: the type of integration of planning sectors, the number of different actors involved and the spatial dimensions of plan areas. The different planning types in

the model, with earlier types in the lower left quadrant and recently emerging types located upper right, should not be regarded as rigid categories, but rather as flexible gradations of integration in road infrastructure planning.

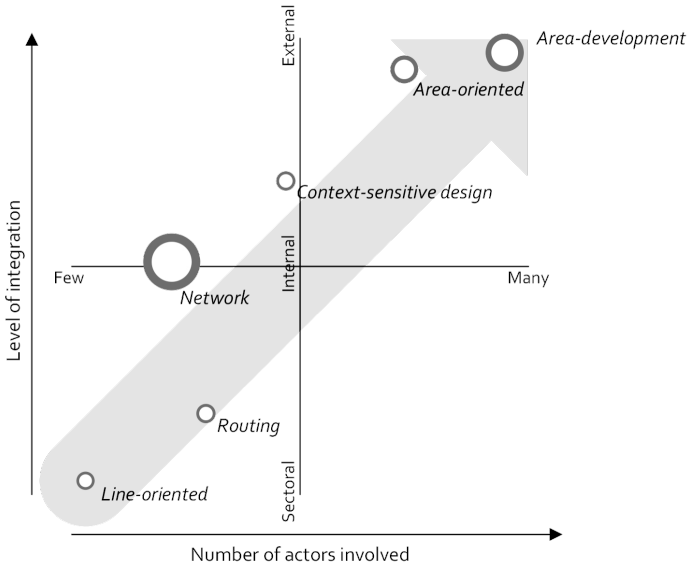

Figure 2.4. Relationship between different approaches to infrastructure planning and the level of integration, actor involvement and spatial dimensions. The size of the dots reflects the spatial focus (small: local focus; larger: regional focus).

Traditional line-oriented approaches are sector-oriented and largely neglect the physical incorporation of the road within a wider area (as indicated by the size of the dots in figure 2.4), fitting within a regulation-oriented planning regime. Residents, municipalities and the private sector are, generally speaking, involved only to a limited extent in motorway planning. Involvement is usually restricted to moments of formal participation: the process has a rather technocratic and hierarchical character, dominated by central government. However, as mentioned in the previous section, this apparently worked well in the era of development of a large-scale motorway network, connecting centres of population, industry and economy across regions or countries. The Dutch National Road Infrastructure Plans of the 1960s ('Rijkswegenplan') illustrates this duality: straight lines as connections between nodes on a map, regardless of potential environmental constraints.

An early step in the development towards area-oriented planning is internal integration, where a new road was seen as part of the wider transportation network, including other roads and other transport modes and consequently involving an increasing number of different actors from within the mobility and transportation sector. Regarding external integration, routing, with its first minimal recognition of the importance of road surroundings, can be seen as an initial step in that direction. The earlier mentioned Dutch programmes 'Route Design' and 'Motorway Panoramas' take a more thorough approach

which could be described as context-sensitive designs (according to the term used in the USA: Nassauer & Larson, 2004 and Stamatiadis, 2005). These approaches have emerged from an increased demand for attention to the more aesthetic aspects of road infrastructure planning. The piece of road infrastructure – the line – remains central to the planning process, but efforts are made to improve the spatial quality of the road and it surroundings and to avoid negative effects. Design solutions are applied to make the road part of the identity of the environment (Shannon & Smets, 2010). Compared to the network approach and routing, the context sensitive approach can be regarded as being more externally integrated with stronger coordination between the transport planning and spatial planning sector (Van Zelm van Eldik, 2008).

Where the above approaches are still primarily internally oriented the following approaches look for synergetic development of road infrastructure and the surrounding area. Area-oriented planning integrates transport objectives with further developments in a specific area. A more effective and efficient planning process could emerge from broader and earlier involvement of different but complementary – rather than conflicting – actor interests. However, also in these approaches the road remains central to the planning process; expanded road capacity may trigger additional spatial developments (Arts & De Vaan, 2010).

In contrast, area-development processes are the result of a collaborative planning process, taking into account all the interests in an area (total design). The potential need for new road infrastructure is derived from the mobility demand determined by the development of other functions (Arts & De Vaan, 2010; Panman, 2009). A practical example in the Netherlands is the integrated spatial improvement of large areas – encompassing urban spaces and the surrounding peri-urban and rural parts – which include infrastructure-related investments among the wider spatial investments. Compared to area-oriented planning, area-development is even further externally-oriented with a broader area and actor focus. The dimensions of the plan area can well extend beyond the local perspective of the area-oriented approach.

2.4.2 Developments in spatial-functional and institutional designs

Regarding the developments in Dutch road infrastructure planning, we distinguish three closely interlinked dimensions of planning. First, a substantive perspective on planning focuses on the physical-spatial outcomes of planning actions. However, since no actor involved in infrastructure planning is capable of tackling the complexity of the planning issues at hand alone, processes of stakeholder interaction and collaboration are closely related. This is the second dimension in our description. Third, structure is provided to the planning process by means of legal procedures and instruments, forming the framework within which planning takes place. We have combined these latter two dimensions into an organizational perspective on motorway planning.

Spatial-functional perspective

Regarding the spatial-functional perspective on integrated infrastructure planning, the concept of spatial quality is an important evaluation criterion in Dutch spatial policies (e.g., VROM et al., 2004; see also Janssen-Jansen, 2007). Spatial quality could be considered

as the further utilization of the sustainability concept – interpreted as the earlier mentioned integrated perspective on the economic, environmental and social/cultural aspects of growth and development – in the field of spatial planning (Hooimeijer et al., 2001). It is also often regarded as a 'catch-all' concept (see e.g. De Zeeuw, 2007). Focusing on spatial quality, economic aspects can, for instance, relate to changes in the number of companies, the rise or fall of land prices and to impacts on mobility or accessibility. Environmental aspects include issues such as the change in supply of valuable nature and the number of transections by motorways causing fragmentation of areas. Finally, social aspects are linked to changes in the income distribution of an area, but also have to do with changes in the number of recreational facilities. Above all, spatial quality is determined by the synergy between all these factors (Janssen-Jansen, 2007). From a planning perspective, it can be hypothesized that more inclusive area-based planning leads to a higher spatial quality than line-based planning, since area-based planning aims to include different interests. However, much will also depend on the specific context. In some non-complex planning situations (few differing interests, no spatially conflicting claims), for instance, straightforward line-planning may suffice.

Organizational arrangements

As the shift from line-oriented towards more area-oriented types of planning is gradually taking place in the Netherlands, several changes to the planning processes can be identified. As mentioned earlier, the current focus in planning is on allowing development to take place as long as this development meets a certain basic quality, prescribed by regulation (VROM et al., 2004). Salet and Woltjer (2009) observe a regime change towards more proactive planning in which public and private agencies share the initiative of spatial intervention.

This new integrative intention is also reflected in governance-inspired steering styles, in which vertical and horizontal coalitions of public and private actors collaborate to arrive at shared development visions (Priemus et al., 2001, Hajer et al., 2004 and Banister, 2008). Such governance attitudes are different from the traditionally prevalent government perspectives, which are characterised by hierarchical steering, limited strategic planning capacities, inflexible bureaucratic processes and generic solutions. Salet and Woltjer (2009) argue for a style of policymaking that "revolves around the ability to build coalitions, and orchestrate various interests in planning processes. With increasing numbers of actors being involved in planning, Koppenjan and Klijn (2004) indicate that such shared visions of actions and solutions are only created through engaging in interaction and gaining information on mutual standpoints. Therefore, integrated approaches to infrastructure planning find more benefit in fluid, multilevel governance networks since these are more strategic and flexible in their actions and are better able to involve a plurality of actors in the planning process. As such, governance networks form a functional response – in planning as well as in other public policy fields – to the increasing need for vertical and horizontal coordination in dynamic societies (Sørensen & Torfing, 2009).

The shift from hierarchical, technical-rational ways of planning towards more integrative, governance inspired types of planning does not mean, however, that more formal planning procedures and instruments are no longer useful and necessary. Without clear rules and responsibilities, integrative policymaking and governance attitudes can appear

to be unstable and diffuse, leading to less efficient outcomes and even to chaos, especially when planning tasks are complex, as is often the case with integrated approaches. Therefore, authors such as Jessop (2002), Koppenjan and Klijn (2004) and Sørensen and Torfing (2009) argue, in line with the Elverding-recommendations, for institutional structures to serve as frameworks to ensure "effective and democratic network governance". Regarding the developments in the Dutch road infrastructure planning sector, experts conclude that the 'paradigm change' – being the replacement of line-oriented infrastructure planning by area-oriented planning – seems to have already taken place in the minds of policymakers and the other actors involved, but that procedural instruments and regulations have to be further accommodated to this change. Procedural innovations, are primarily to be established in regulations and policy instruments, providing legitimacy and support to area-oriented planning processes and their spatial objectives. Therefore, in the Netherlands procedural arrangements are increasingly being reconsidered to meet the demands of external integration in infrastructure planning. As an example, the previously described Long-range Programme for Infrastructure, Space and Transport (see table 2.1) and its accompanying framework of rules provides legal, financial and administrative basis for integrated road infrastructure planning. The core of integrated planning is now in the early stages of project development. These stages are linked to strategic structure visions under the Spatial Planning Act 2008 and to strategic environmental assessments which are subsequently elaborated in specific land-use plans or route plans in combination with project-level environmental impact assessment.

2.5 International perspectives on integrated road infrastructure planning

2.5.1 The strategic planning level

Integration between spatial planning and infrastructure planning

The integration of road infrastructure planning and further spatial planning sectors is not a uniquely Dutch phenomenon. At a strategic policy level, this trend can also be observed in other Western countries. In the USA, for instance, a strategic partnership for sustainable communities has recently been established at the federal level to break down the traditional silos of housing, transportation and environmental policy. The practical goals of the partnership are affordable housing, more transportation options and lower transportation costs (EPA, 2010). Canadian experience also shows that integrated community planning approaches contribute to the realisation of sustainable planning objectives, including road infrastructure (Connelly et al., 2009). In addition, in the southern hemisphere, Australian planning policy considers the integration of policy sectors – referred to as cross-sectoral linkages – as a crucial means of linking infrastructure investments and planning for sustainability. The introduction of place or community-based planning policies in several locations, aiming at integrated urban renewal and infrastructure projects, can be regarded as local examples of these linkages (Walsh, 2001; see also Untaru, 2002). A transport policy example that appears to show even more correspondence to the Dutch case can be found in New Zealand. New Zealand's Transport Agency (NZTA) promotes an integrated planning strategy and aims to bring together land-use planning, transport planning and transport investment. The aim is to deliver "an

affordable transport system that supports a growing economy, safe and vibrant communities and a healthy environment, now and in the future". The strategy is expected to improve transport efficiencies, enhance quality of life through better management of social and environmental impacts and, finally, to generate employment and public wellbeing (NZTA, 2010).

In the UK, guidance documents indicate that transport plans should be consistent and complementary with other local development strategies (DETR, 2000; Headicar, 2009). Since 2004 the UK has been putting into practice a system of development planning, focusing on a broadly scoped, integrated spatial planning approach, including lower-scale level road infrastructure, that "goes beyond traditional land use planning to bring together and integrate policies for the development and use of land with other policies and programmes, which influence the nature of places and how they can function" (Nadin, 2007; see also Kidd, 2007).

Towards new governance arrangements

Integration of infrastructure and spatial policy requires governance approaches that are different from the traditionally prevalent government attitudes. Improved networks for vertical and horizontal collaboration of public and private actors, with the state as an enabler of developments, are needed (Priemus et al., 2001; Allmendinger & Haughton, 2009). This goes hand in hand with devolution of political powers to local levels, such as regions, sub-regions, cities and neighbourhoods. Such trends towards stronger multi-scalar governance and so-called development planning are not only observable in the Netherlands.

Venner et al. (2007) indicate that in the USA the idea is prevalent that successful solutions are dependent on collaboration and interdisciplinary approaches to the design of solutions. First, horizontal cooperation seems to be mainly focused on the operational sides of planning. In addition, the rearrangement of vertical process relationships appears an important theme in the discussion on the convergence of road infrastructure and spatial planning. Furthermore, the emergence of the previously described place or community-based strategies in Canada and Australia can be regarded as examples of combined vertical and horizontal integration processes (Connelly et al., 2009). Somewhat in contrast to the Netherlands, however, Australian planning seems to have been recentralized over the past decade, with the state planning departments increasingly operating in a top-down manner, formulating directions and guidelines for state development on a broad range of planning topics. Community and private developers have been largely absent and hesitant of becoming involved in Australian spatial planning (Searle and Bunker, 2010).

In Europe the UK has been putting into practice a system of development planning. Kidd (2007) argues that due to this horizontal policy integration, an increasingly broad spectrum of organisations has become involved in public policy delivery, encompassing public, private and voluntary sectors. An important aspect of these new patterns of governance has been an emphasis on openness and transparency, broad stakeholder engagement and consensus building in policy development and delivery. However, the Netherlands aside, in other countries on the European mainland developments regarding

vertical and horizontal relationships in planning processes seem to receive less attention. Cooperation between various administrative layers is not self-evident and in some cases even counterproductive: in countries such as Spain and Germany there seems to be a tendency for different administrative layers to compete with each other. Regarding the horizontal process arrangements, France and Germany have taken the first careful steps towards integration by means of the establishment of comprehensive spatial ministries. However, for the time being, these administrative integrations are not stimulating integrated infrastructure and spatial policies (Van de Wiel, 2010).

2.5.2 Tactical and operational planning level

Context-sensitive approaches in motorway planning

Regarding the tactical and operational levels of motorway planning, the main focus abroad seems to be on context-sensitive approaches (according to US-terminology Nassauer & Larson, 2004). In the USA this policy has been developed by the individual departments of transportation in several states in order to establish an infrastructure planning process which aims at high quality designs, combining capacity and safety issues with human and environmental needs (Stamatiadis, 2005). Developed context-sensitive policies pay specific attention to the addition of lasting community value by means of excellent designs, which are to be achieved through the preservation of community resources and natural, cultural and scenic resources, while causing minimal disruption and efficient and effective use of resources (Venner et al., 2007).

Influenced by the 'Urbanism' tradition aesthetic values seem to play an influential role in the planning of motorway infrastructure in France and Spain. The primary focus is on the road users, who should experience characteristic national landscapes. The opposing perspective – from the surrounding area towards the road – seems to attract far less attention (Van de Wiel, 2010). A comparable situation can be observed in Denmark, where the national road directorate has developed a 'Strategy for beautiful roads', taking an architectural approach to road infrastructure planning. This policy intends to deal with a combination of factors that influence road infrastructure planning, including aesthetics, safety, planning, ecology, history and civil engineering (Van de Wiel, 2010; DRD, 2002). While the direct surroundings of the road seem to be becoming increasingly involved in motorway planning, the level of integration with spatial policy sectors outside the infrastructure planning field generally remains quite modest. Environmental impact assessment techniques (EIA), for instance, are applied by many countries to determine and, subsequently, mitigate the negative environmental effects of new road infrastructure. However, they are primarily meant to 'protect' the environment instead of co-developing the road and its environment in a sustainable way.

Multi-modality and network integration

Another approach to sustainable motorway planning would be to use the current road capacity in such a way that new road developments are not necessarily required. Sustainable mobility policies aim to achieve this by reducing car dependence and by shortening distances (Banister, 2008). With the aim of better exploitation of the current transport system, we can observe a trend towards the development of high quality multi-

modal transport networks, requiring advanced policy coordination, within and outside the traffic and transport sectors.

In the USA and the UK road infrastructure policy is increasingly focusing on transport network coherence and seeks to deliver wider community aspirations than merely transport. In the USA the planning of transportation facilities has traditionally been considered a self-serving activity. Since the early 1990s several changes have taken place in US spatial and transport planning policy, such as the Intermodal Surface Transportation Efficiency Act of 1991 (Weingroff, 2001) and the Transportation Equity Act of 1998 (USDOT, 2011), which also led to the recognition of the importance of multimodal solutions. An often applied land-use-related strategy to increase public transport efficiency in the USA, but also in other countries such as Canada, Australia and Japan, is transit oriented development (TOD), which can be understood as the integration of public transport infrastructure and spatial development. Mixed-use developments are encouraged around multimodal transit nodes and corridors in order to promote balanced and compact development. As such, TOD provides a resource efficient alternative to automobile-based land use patterns (Curtis & Renne, 2009). TOD is generally expected to offer "tremendous sustainability benefits", especially in urban or peri-urban contexts where the opportunities for successful public transport are highest (Cervero, 2009). In the USA, the attention for land-use transport integration and multi-modality seems to differ substantially throughout the country. Especially some western states, such as Washington, California, and Oregon in particular seem to be frontrunners. Oregon and Washington, for instance, ask local agencies to come-up with comprehensive plans, which include growth boundaries. Moreover, within Oregon, Metro Portland is the only MPO in the US with land use control, which has resulted in compact city development with large investments in and use of public transport. An example of a reconsidered transport network can be found in Boston, where the Boston Transportation Planning review has taught planners that successful revision of a metro scale transport network involves a joint assessment of macro effects (transport network) and micro effects (e.g., local design) of the planned efforts (Gakenheimer, 1976).

The UK reform of the planning system also rephrased the relationship between road infrastructure policy and the spatial planning system. The emphasis is on sector internal measures aiming at the enhancement of accessibility through multimodal solutions, including encouragement of public transport, cycling and walking (Headicar, 2009). Further comparisons on the European mainland reveal that Scandinavian countries such as Sweden and Denmark, and to a certain extent France, are also making efforts to create sustainable, multimodal transport networks in which spatial-economic values no longer trump social and environmental values (Van de Wiel, 2010; Hull, 2011). However, despite being a policy priority in many countries, due to institutional constraints the establishment of sustainable regional transport networks appears rather cumbersome: responsible regional authorities often lack the capacity and funds to initiate successful regional transport developments (Hull, 2011).

2.6 Discussion and themes for further research

In this chapter we aimed to explore and conceptualize the transition from line-oriented approaches to area-oriented approaches in Dutch motorway planning and to gain greater insight into whether comparable developments can be observed in other countries. By means of a review of available literature and policy documents we explored developments in the Netherlands and other nations. First of all, we conclude that the shift from line- to area-oriented planning is indeed observable in the Netherlands. We further conclude that the developments in the Netherlands are part of a broader international trend, all closely corresponding to the broadly-shared strategic goal of promoting sustainable development. However, as practical implementation is strongly dependent on the societal, political and institutional context of the individual planning systems and cases, a wide range of views on integration of road infrastructure and further spatial planning issues exists. In general terms, the approaches explored in this chapter can be characterized, to differing extents, as adaptive cross-sectoral approaches, addressing wider community objectives and involving multiple actors, with changing relationships among and between public, private and community actors. Change, therefore, not only involves content and scope of technical plans and designs, but also covers a desired social transformation, represented by changing organizational and institutional arrangements (Hansman et al., 2006).

A major remaining challenge for planners is finding the right combinations of infrastructural and spatial developments that improve spatial quality. This requires deeper insight into the context specific qualities that areas around road infrastructures acquire from the different functions, such as housing, business, recreation, water and nature. Ideally, this knowledge combines insights on the local effects of a broadened planning scope (e.g., local spatial quality) with an increased understanding of the effects of integrated efforts on a regional scale (e.g., network effects), which are to be considered in more strategic planning stages (see also Bertolini, 2012). Moreover, the success of area-oriented approaches will strongly depend on modified organizational provisions that allow for the desired broader functional and spatial development to take place. This requires the establishment of broad and flexible stakeholder coalitions with actors from different functional sectors and from various government levels, which should aim to focus on mutually shared development directions. One of the complex issues here is finding a good demarcation of the plan area. Taking a more integrated spatial scope may have the potential risk of continuously increasing the study area because essentially everything is related. Spatial demarcation may depend on issues such as spatial-functional coherence, the responsible stakeholders and institutions, the willingness to cooperate and the available resources. Gaining greater insight into such determinants and the delicate trade-offs between them may help planners in future demarcation questions. These insights could, for instance, be gained via in-depth interviews with key stakeholders that are involved in such area-oriented infrastructure projects in the Netherlands.

As indicated earlier there may be a tension between the increased numbers of actors involved in planning and the manageability of the process. Theoretically, the involvement of a greater number of actors increases the context-specific knowledge and the potential of more optimal outcomes. Simultaneously, however, a broader interaction may result in fresh time and cost overruns. Moreover, there is a potential for difficulties if the often rigid spatial-administrative frameworks do not correspond to the more flexible demarcation of area-oriented projects. Maintaining or improving the efficiency of the planning process therefore requires institutional structures to serve as frameworks that promote manageability and controllability of the planning process in terms of costs and time. Regarding these institutional issues, we found that procedural arrangements in different spatial policy sectors in the Netherlands are increasingly being attuned in order to facilitate area-oriented planning (see e.g., the Elverding recommendations). However, insight into the effectiveness of these measures would ideally require a longitudinal study approach, in which a large amount of area-oriented projects is monitored during the different planning stages. This is, however, a costly and time intensive process. On the shorter term it may, therefore, also be interesting to explore experiences of actors that are currently involved in area-oriented projects such as to identify opinions on cooperation and on how existing procedural arrangements are supporting or frustrating the integrated objectives and promotion of spatial quality in road infrastructure planning.

Finally, we found that the emergence of modified governance processes in motorway planning practice primarily occur outside the European mainland. The Netherlands seems to be an exception here, probably because of the national tradition of cooperation and participation in political planning. In addition, countries such as the USA and the UK are encouraging partnerships and experiment with community-based strategies on a larger scale, in order to enhance their sustainable planning strategies. It may be worthwhile to compare experiences obtained in these different countries more in-depth than we were able to do on the basis of the desktop review in this chapter. This could be done by means of undertaking comparable in-depth interviews in these different countries. However, contextual differences may complicate comparisons to a certain extent.

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